CLAIMS

1. A solar cell employing a titanium dioxide semiconductor, comprising:

a pair of electrodes; and

a titanium dioxide semiconductor which is disposed between the electrodes, the surface and interior of the titanium dioxide semiconductor being formed with pores, and the titanium dioxide semiconductor being arranged so as to form a rectification barrier with respect to at least one of the pair of electrodes.

2. The solar cell as set forth in claim 1, wherein said rectification barrier is formed by contacting the titanium dioxide semiconductor with at least one of said pair of electrodes, and the rectification barrier has a diode characteristic.

3. The solar cell as set forth in claim 1 or 2, wherein the rectification barrier is the shottky barrier being formed by contacting the titanium dioxide semiconductor with at least one of said pair of electrodes.

4. The solar cell as set forth in claim 1 or 2, wherein the rectification barrier is the PN junction being formed by contacting the titanium dioxide semiconductor with at least one of said pair of electrodes.

5. The solar cell as set forth in any one of claims 1 to 4, wherein the electrode, with which said titanium dioxide semiconductor forms the rectification barrier, is formed in such a way as to penetrate into the surface of the titanium dioxide semiconductor and the interior thereof.

6. The solar cell as set forth in any one of claims 1 to 5, wherein said titanium dioxide semiconductor has a porosity

of 5 to 90%.

7. The solar cell as set forth in any one of claims 1 to 5, wherein said titanium dioxide semiconductor has a porosity of 15 to 50%.

8. The solar cell as set forth in any one of claims 1 to 5, wherein said titanium dioxide semiconductor has a porosity of 20 to 40%.

9. The solar cell as set forth in any one of claims 1 to 8, wherein said titanium dioxide semiconductor is porous and has the fractal structure.

10. The solar cell as set forth in any one of claims 1 to 9, wherein the electrode with which said titanium dioxide semiconductor form the rectification barrier is formed from a transparent electrode made of ITO or the like, or a metallic electrode made of a metal selected from the group consisting of Al, Ni, Cr, Pt, Ag, Au, Cu, Mo, Ti, and Ta, or a metal compound containing therein any one or more of these metals.

11. The solar cell as set forth in any one of claims 1 to 9, wherein the electrode with which said titanium dioxide semiconductor forms the rectification barrier includes a solid iodide.

12. The solar cell as set forth in claim 11, wherein the electrode with which said titanium dioxide semiconductor forms the rectification barrier includes CuI (copper iodide).

13. The solar cell as set forth in claim 11, wherein the electrode with which said titanium dioxide semiconductor forms the rectification barrier includes AgI (silver iodide).

14. The solar cell as set forth in any one of claims 1 to

13, wherein the electrodes are formed by vacuum evaporation.

15. The solar cell as set forth in any one of claims 1 to 13, wherein the electrodes are formed by spattering.

16. The solar cell as set forth in any one of claims 1 to 13, wherein the electrodes are formed by printing.

17. The solar cell as set forth in any one of claims 1 to 16, wherein said titanium dioxide semiconductor is subjected to visual rays absorbable processing to enable absorption of visible rays.

18. The solar cell as set forth in claim 17, wherein organic dye is adsorbed to said titanium dioxide semiconductor.

19. The solar cell as set forth in claim 17, wherein inorganic dye is adsorbed to said titanium dioxide semiconductor.

20. The solar cell as set forth in claim 19, wherein the inorganic dye, being adsorbed to said titanium dioxide semiconductor, includes inorganic carbon.

21. The solar cell as set forth in claim 19, wherein the inorganic dye, being adsorbed to said titanium dioxide semiconductor, includes an inorganic matter obtained by dying carbon.

22. The solar cell as set forth in claim 17, wherein said titanium dioxide semiconductor has oxygen defects.

23. The solar cell as set forth in claim 17, wherein said titanium dioxide semiconductor includes impurities such as Cr and/or V.

24. The solar cell as se t forth in claim 23, wherein said titanium dioxide semiconductor includes Mo.

25. A solar cell unit employing a titanium dioxide semiconductor, comprising:

a solar cell which includes a pair of electrodes, and a titanium dioxide semiconductor disposed between the electrodes, the titanium dioxide semiconductor being formed with pores, and

first and second substrates which holds the solar cell therebetween.

26. The solar cell unit as set forth in claim 25, wherein the first and second substrates are arranged so that solar rays enter from the side of one of the substrates, in which the other substrate being arranged at the opposite side is coated with a reflection film or having a reflection film thereon.

27. The solar cell unit as set forth in claim 25 or 26, wherein the space between the first substrate and the second substrate is filled with an inert gas such as argon gas.

28. The solar cell unit as set forth in any one of claims 25 to 27, wherein at least one of the first and second substrates being arranged at a side from which solar rays enter is formed into a transparent substrate or a translucent substrate formed of glass, plastic or synthetic resin.

29. The solar cell unit as set forth in any one of claims 25 to 28 wherein at least one of the first and second substrates arranged at a side from which solar rays enter has a top surface and a bottom surface, and an anti-reflection film is coated or placed on the top surface or bottom surface.

30. The solar cell unit as set forth in any one of claims

25 to 29 wherein at least one of the first and second substrates arranged at the side from which solar rays enter has a top surface, and a light catalyst made of titanium dioxide (TiO_2) is coated on or placed on the top surface of the substrate.